

## Preface

This monograph represents 30 years of scientific cooperation on the study of the basic biology of photomovement in algae between the National University of Life and Environmental Sciences of Ukraine (Prof. Yuriy Posudin) and the M.G. Kholodny Institute of Botany of National Academy of Sciences of Ukraine (Prof. Nadiya Massjuk and Dr. Galyna Liliitskaya). It reviews the historical development and current state of the art in the biology of photomovement in algae. Problems in terminology and a logical basis for classification of photomovement in microorganisms are discussed. The research has focused on two species of *Dunaliella* Teod., *D. salina* Teod. and *D. viridis* Teod., as the principal organisms investigated.

The results of experimental investigations on the critical factors controlling and modulating photomovement are described and include the effects of various abiotic factors, critical aspects of photomovement such as photoreception (i.e., location and structure of photoreceptor systems, composition of photoreceptor pigments, mechanisms of photoreception and photoorientation), sensory transduction of absorbed light into signals that govern the activity of the motor apparatus, and flagellar activity.

Various aspects involved in the utilization of these species as models for studying photomovement, such as testing aquatic media and the effects of surface-active substances, salts of heavy metals, and pesticides on algal photomovement parameters are described. Vector methods for testing are proposed for assessing the action of various chemicals. Likewise, the potential of using the two species as organisms for transgenic alteration, such as enhanced production of  $\beta$ -carotene, ascorbic and dehydroascorbic acids, glycerin and other valuable organic compounds are described.

The results of photomovement investigations are assessed relative to the evolutionary biology of algae and their phylogenetics, systematics, taxonomy, ecology and geography. Critical aspects of photomovement biology that remain to be investigated in flagellates are discussed.

The monograph is intended for algologists, protistologists, hydrobiologists, biophysicists, physiologists, ecologists and biotechnologists, teachers, post-graduate students and students of related biological specialities.

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